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Policies for eliminating low-efficiency production capacities and improving energy efficiency of energy-intensive industries in China

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ABSTRACT

China faced the greatest challenge in balancing its economic growth, energy and resource security as well as environmental pollution. The energy-intensive industries, which used to be the major force driving China's economic growth, had seriously exhausted the countries' natural resources and energy, and at the same time polluted the environment because of the severe surplus of low-efficiency production capacities. As a result, the Chinese government had initiated multiple economic and administrative policies to eliminate these low-efficiency production capacities intended to improve the energy efficiency of energy-intensive industries. These policies are summarized in this paper, along with export tax rebating rate, resource tax, administrative audit and approvals, differential electric power pricing and shutting down the low-efficiency production capacities. The paper also evaluates the effects of these policies by analyzing several key indicators about the energy-intensive industries, including fixed asset investment growth rate, energy-intensity of industrial added-value, waste gas emission-intensity of industrial added-value. The VALDEX methodology is selected to examine the improving trends of energy-efficiency for energy-intensive industries. The analyzing results show that firstly the development of low-efficiency capacities tends to be more sensitive to the policies, so the policies that China had enacted really exert very important effects on improving the energy-efficiency of energy-intensive industries. However, the effects of economic policies seem more faster and obvious than the fiscal policies. Besides, the results also show that polices which are designed to reserve energy may not necessarily exert the same effects on reducing emissions. There is still large room for improving the energy efficiency of energy-intensive industries, substantial improvement still needs to be done for current policies' system. Some suggestions for future work are provided.

Contents

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1. Introduction

It becomes increasingly obvious that China should make great effort in balancing its economic growth with the energy and resource as well as environmental security. During last few years, China's economy underwent several rounds of rapid growth and the country became the second richest country since its gross domestic product (GDP) exceeded that of Japan in 2010. Meanwhile, China's energy consumption also increased dramatically during that period. The statistics showed that by the end of 2009, China had overtaken US and become the world's largest energy consumer [17], while in 2000 the total energy consumption of China accounted for half of that of the US. China's energy intensity of GDP was obviously higher than those of the developed countries (Fig. 1), which demonstrated that China's high economic growth was at the expense of energy exhausting. The frequently occurring environmental degradation events, such as the wide range of fog and haze weather appearing in the mid-east region, emergence of cancer villages surrounding the large industrial parks and milk or blood river near the unqualified dyeing factories, also gave alerts that the current economic growth was at the base of environmental destruction.

The bad situations made the citizens to complain about their decreasing living standards and health to the government through various ways like webs, petitions and microblogging. And the government also realized that the economic growth relying on developing high-energy consumption and high-pollutant emissions industries could not be sustained and began to enact several policies to save energy and protect the environment. The energy-intensive industries, which used more than half of the countries' total energy while contributed only about one tenth of the total GDP, were considered to be of low energy-efficiency and high environment-pollution because they had plenty of low-efficiency production capacities. So the energy-intensive industries fall in the scope of key governmental regulations, and in last few years many economic and administrative measures have been taken to eliminate the low-efficiency production capacities of energy-intensive industries, including

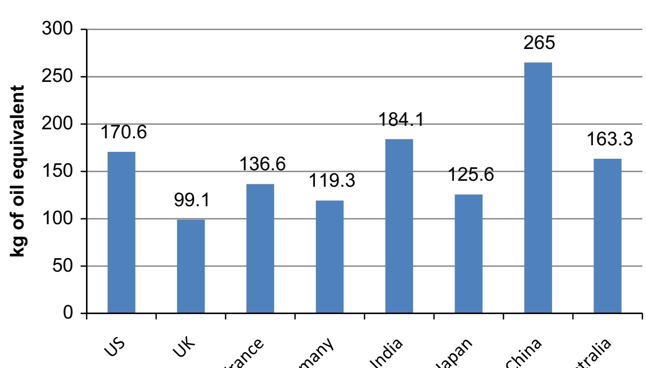

Fig. 1. Energy consumption per $1000 GDP (constant 2005 price) for several countries in 2010.

1. reducing the export tax rebate rates for some important energy-intensive products, like steel, cement, and aluminum, to shrink their exports;
2. implementing resource tax policies for the energy-intensive enterprises to increase their energy consumption costs and stimulating them to reduce energy consumption;
3. centralize the power of administrative audit and policy approval authority to control the over-investment of energy-intensive industries;
4. implementing the differential electric power pricing (DEPP) policy and punishment electric power pricing (PEPP) policy to force the low-efficiency forces with high electricity consumption to withdraw from the market.

The effects of these policies were confusing; some policies played an active role in improving the energy efficiency of the energy-intensive industries, but some other policies exerted little effects on controlling the blind investment. It is necessary to assess the effects of these policies so as to find out the problems in current policies' systems, and this is one of the main topics that this work wants to cover.

In understanding the impacts and effects of energy-efficiency policies the energy efficiency indicator (EEI) has become a fundamental tool, and it is very helpful for making cross-sector and cross-economy comparisons. Several indicators have been developed to evaluate the energy-efficiency of economic activities and according to the study of Patterson [24] at least four kinds of EEIs can be used to measure energy efficiency, including the thermodynamic EEIs, physical-thermodynamic EEIs, economic-thermodynamic EEIs and economic EEIs, of which the economic-thermodynamic EEIs and physical thermodynamic EEIs are the most popularly used in current

studies. The economic-thermodynamic EEIs are computed based on real GDP, while the physical-thermodynamic EEIs are computed based on the physical output volume index [44]. Some research works where economic-thermodynamic EEIs have been used to analyze the energy efficiency are Streimikiene [8], Martínez [7], Steenhof [31], Ang et al. [2], Al-Mansour [14] and Chang [23]. These studies mainly examine the change of energy intensity in different ways, of which Streimikiene [8] and Martínez [7] use the energy intensity to analyze the regional energy efficiency while Steenhof [31] and Ang et al. [2] use decomposing methods to find out the driving forces for the change of energy intensity. Chang [23] uses the DEA method to estimate the improving potential of energy intensity. Some research works that have used the physical-thermodynamic EEIs to analyze the energy efficiency are [14,44,9]. Sometimes, the results of physical-thermodynamic EEIs can be very different from the results of economic-thermodynamic EEIs [36], and it is difficult to point out which kind of EEI is better since each kind of EEI has its limitations. In this work we mainly want to examine the effects of energy-efficiency policies on energy-intensive industry and the trends of energy-efficiency will be analyzed, coupled with some comparison among different energy-intensive industries. Because the physical-thermodynamic EEIs are computed on the basis of output volume, it is difficult to make comparison among sub-sectors with different units. Meanwhile the statistic data on physical output volume of each energy-intensive industry is difficult to obtain because of the statistical inconsistencies between the output volume and energy consumption in China; hence we use the economic-thermodynamic EEIs to examine the effects of energy efficiency policies. The ODEX index developed by Odyssee project [30] is an useful means to analyze the energy efficiency trends of energy-intensive industries due to its superiority in tracking the energy efficiency trends at an aggregate level (overall economy, industry, households, transport, services) [14]. However, the ODEX index was computed based on output volume; [45] developed an index called VALDEX on the base of ODEX index in which the calculation basis was replaced by value-added data so as to make cross-sector comparison. In this regard, the VALDEX index is used in this work to analyze the energy-efficiency trends and make comparison between different sub-sectors of the energy-intensive industries.

This paper is structured as follows. Section 2 briefly analyzes the current economic situation and energy consumption of the energy-intensive industries, Section 3 summarizes the main policies (see Appendix A), Section 4 evaluates the effects of these policies by firstly introducing the methods used, and then the data collection and finally presenting the results, Section 5 points out the problems and provides guidelines for future improvements and Section 6 concludes this work.

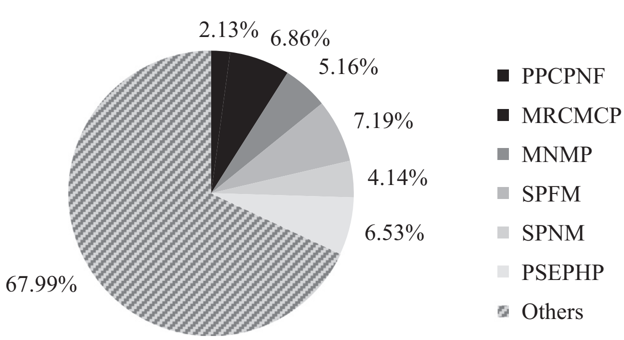

Fig. 2. The GDP contributions of the energy-intensive industries in 2012.

2. Status of energy-intensive industries in China

Energy-intensive industries, also called high-energy consuming, high-pollution and resource-intensive industries, include Processing of Petroleum, Coking, Processing of Nuclear Fuel (PPCPNF), Manufacture of Raw Chemical Materials and Chemical Products (MRCMCP), Manufacture of Non-metallic Mineral Products (MNMP), Smelting and Pressing of Ferrous Metals (SPFM), Smelting and Pressing of Non-ferrous Metals (SPNM), as well as Production and Supply of Electric Power and Heat Power (PSEPHP) as stated in '2010 National Economic and Social Development Statistics Bulletin of China' [25].

The main products of the PPCPNF industry include petroleum, gas products, uranium and so on. Fertilizers, cosmetics, dyes and plastics are the main products of the MRCMCP industry, and cement, brick, glass, and ceramics are mainly produced by the MNMP industry. As for the SPFM industry, the main products include steel, iron, ferroalloy and so on. Other metals like copper, aluminum, and lead are the main products of SPNM industry. Electricity and heat are the main products of PSEPHP industry.

2.1. Economic status and geographical distribution

According to the statistics stated in 'China Statistical Yearbook 2013' [26] published by the National Bureau of Statistics of China the GDP of China in 2013 was 51,947.01 billion RMB, and all the manufacturing industries contributed 19,967.07 billion RMB, in which the energy-intensive industries completed 5086.6 billion RMB, accounting for 12.30% of the whole countries' GDP and 32.01% of the manufacturing industrial aggregate added value. The GDP contribution of each energy-intensive industry was very small and varied

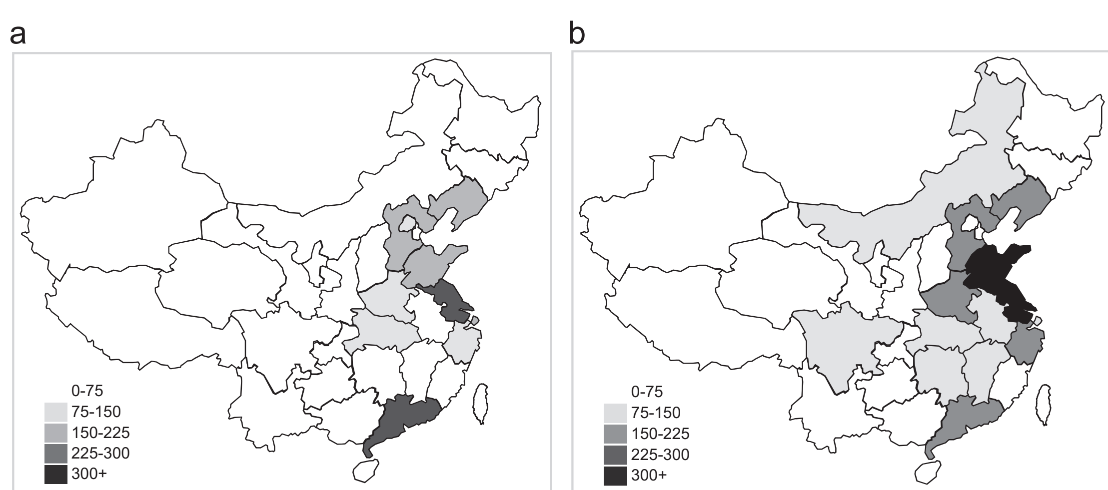

Fig. 3. Comparison of the regional distribution of energy-intensive industries in 2000 and 2011.

(Fig. 2). Among them the SPFM industries' GDP contribution was the largest followed by the PSEPHP industry and MRCMCP industry, whose contributions were slightly lower than that of the SPFM industry. The GDP contributions of the MNMP industry, SPNM industry and PPCPNF industry were relatively smaller, while the contribution of PPCPNF industry was obviously lower than those of the other manufacturing industries.

Most of the energy-intensive industries are located in the middle-east regions of China, such as Jiangsu, Zhejiang, Hebei, Henan and Guangdong province. Fig. 3 presents a comparison of the distributions of energy-intensive industries in 2000 and 2011, using the industrial gross output value collected from 'China Industry Economy Statistical Yearbook 2001' [11] and 'China Industry Economy Statistical Yearbook 2012' [10] to represent the industrial intensity of energy-intensive industries in a region, and in this the industrial gross output values in 2011 are converted to the price level of 2000 through dividing by the accumulative index of industrial gross output value in 2001–2011 for better reflecting the real changes. It can be clearly seen that there are two important evolvement changes of the energy-intensive industries' distribution in 2001–2011. The first one is that the overall actual industrial output level increased during this period. In 2000 there were only 10 provinces, of which the industrial gross output values were more than 75 billion RMB, while in 2011 the number was expanded to 14. Meanwhile in 2000 there were only 3 provinces of which the actual industrial gross output values fall in the range of [75,150] billion Yuan, 4 in [150,225] and 2 in [225,300]. However, these numbers had increased to 7 in [75,150], 5 in [150,225] and 2 above 300 billion Yuan in 2011. This proves that the average industrial gross output value had increased during this period. The second point is that the energy-intensive industries increasingly agglomerated in the coastal areas like Shangdong, Jiangsu province, whose actual gross output values increased to more than 300 billion Yuan by the end of 2011. Meanwhile, it can be also noticed there is a trend of energy-intensive industries spreading to the regions nearby coastal areas, such as Inner Mongolia, Anhui and Jiangxi province.

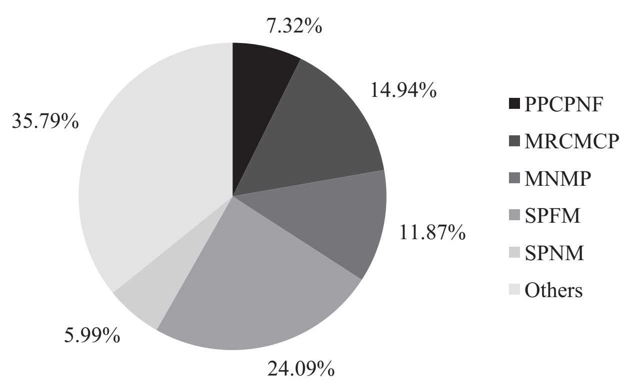

Fig. 4. The energy consumption share of the energy-intensive industries in 2012.

2.2. Energy consumption

The recently published 'China Energy Statistical Yearbook 2013' [12] showed that the energy consumption in China was 3.41 billion tons of coal equivalent (tce) in 2012, which ranked top 1 in the world. All the manufacturing industries consumed 2.52 billion tce, accounting for 74.02% of the countries' total energy consumption, and the energy-intensive industries consumed 1.59 billion tce, accounting for 46.62% of the countries' total. Among them, the energy consumption of the SPFM industry ranked the first, followed by the MRCMCP industry (Fig. 4). The shares of the MNMP industry and PSEPHP industry were slightly lower than that of the MRCMCP industry, and the energy consumptions of the PPCPNF industry and SPNM industry ranked the last two of all the energy-intensive industries.

The energy intensities of the energy-intensive industries also varied. As shown in Fig. 5 the energy efficiencies of the energy-intensive industries were lower than those of the other manufacturing industries, especially the SPFM industry and PPCPNF industry. The energy intensity levels of PPCPNF and SPFM industry were 36.04% and 32.93% higher than the average level of the energy-intensive industries, and almost 3.36 and 3.29 times of the average level of manufacturing industries respectively. The energy intensities performance of the SPNM industry was better than those of the other energy-intensive industries, but the levels were also obviously higher than the average level of manufacturing industries.

2.3. Utilization of production capacities

It is an indisputable fact that the production capacities of some energy-intensive industries in China like steel, cement, electrolytic aluminum, glass and shipbuilding has reached superabundance. For example, at present, China's crude steel production capacities accounted for nearly 46% of the global capacities, with 72% of them utilized; the electrolytic aluminum production capacities accounted for 42% of global capacities, also with 72% of them utilized; the cement production capacities accounted for 60% of the world, with 73% of them utilized, the flat glass production capacities accounted for half of global capacities, with 68% of them utilized; the capacities utilization of shipbuilding industry was even lower, with about only 50% of them utilized [1].

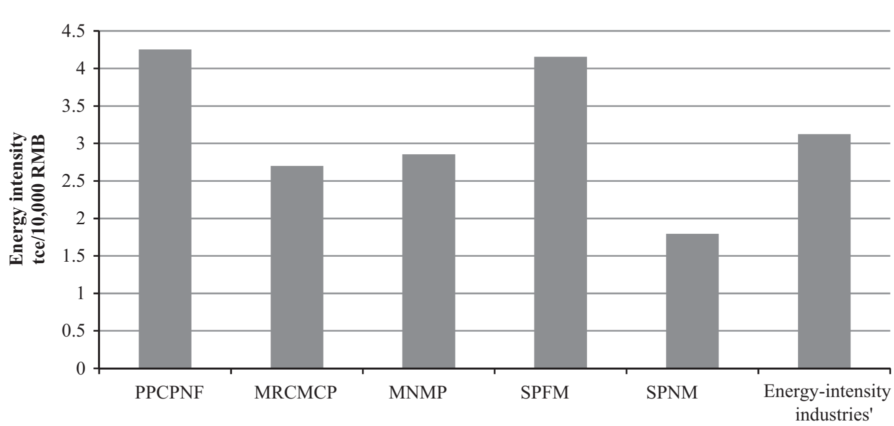

Fig. 5. Energy intensity of industrial added value for the energy-intensive industries in 2012.

3. Overview of the regulating policies

The above analysis shows that the negative effects of the energy-intensive industries in exhausting energy are rather larger than its positive contributions to the economic growth. The Chinese government had also realized this fact and enacted several plans and policies to force these industries to move on to more energy-efficient developing way by forcing the low-efficiency production capacities to withdraw from the market. These plans and policies covered many aspects, including foreign trading, tax, financial control, electric tariff and so on (Appendix A) and the following part will summarize them to show how they were enacted and targeted.

3.1. Export tax rebating

In 1980s, there was a trend where some energy-intensive industries from developed countries like US and Japan began to seek new plant sites for evading the domestic strict environmental governance and increasing labor costs. This was a very good opportunity for China to create a new force for economic growth by undertaking these overseas transferred energy-intensive industries. In order to create a favorable domestic development environment to attract these industries to transfer in, the State Council (SC) approved the provision on *Levying and Returning the Product Tax and Value-added Tax (VAT) for the Imported and Exported Products* ([21]) drafted by the Ministry of Finance (MF) and State Administration of Taxation (SAT) in 1985. It was stated in this document that the product tax and the VAT of exported products except crude oil and refined oil would be returned when they were exported. The reduced product tax and the VAT directly reduced the costs of energy-intensive products, which made them internationally more competitive, and this further attracted oversees production capacities to transfer into China, which boomed the development of energy-intensive industries in the following two decades.

However it should be noted that most of the production capacities transferred into China are low-efficiency forces with lower energy-efficiency and higher pollutant emissions, coupled with a lack of inadequate assessing and monitoring system for the environment in those years; the country had spent large amount of energy and resources in developing the energy-intensive industries, and at the same time seriously polluted the environment. This made the economy become increasingly unsustainable and the government began to guide the development of energy-intensive industries to be more energy-efficient. One sign of this was the enacting of *Adjusting Export Tax Rebating Rate of Some Commodities* (MF and SAT, 2003) in 2003, according to which the export tax rebating rates of most energy-intensive industrial products were reduced in different levels. The rebating rates for some products like petroleum products, paper, and paper pulp were canceled; for some products like nonwrought aluminum, phosphorus and other phosphorus, unwrought nickel and ferro-alloys it was reduced from 13% or 17% to 8%, and for some products like coke and semi-coke, unwrought refined copper and copper alloys and metal salts and over metal salts it was reduced from 13% or 11% to 5%. This document was the sign that the government would reduce the export of energy and resource-intensive products so as to save vital kinds of energy and resources.

The following 2 years' fast growing of the energy-intensive products' exports proved that the reduced rebating rates did not make these products internationally non-competitive and there still were plenty of low-efficiency production capacities on operation, so the government planned to exert much more higher constraints on the exports of their products. A summary of the works done before 2005 was presented in the notice on *Better Designing Support Measures for Controlling the Export of High Energy Consumption, High Pollution and Resource Products* [27]. It was stated that the rebating rates for some resource-intensive products like coal, zinc, tungsten, tin and antimony would be further reduced to 8% on the base of 2003 on May 1, 2005, and the rebating rates for some products like electrolytic aluminum, ferroalloy, phosphorus, and calcium carbide would be canceled since their over-production had intensified the domestic electricity supply shortage. Combined with other measures like export tariffs and credit control, it was expected the exports of energy-intensive products could be effectively reduced after the implementation of this policy.

On March 16, 2006, the Chinese government published its ‘eleventh five-year (2006–2010) plan [5]’ for the economic and social development. As planned, China would strictly restrict or prohibit the foreign investment projects on pollution-intensive, energy-intensive and resource-intensive industries as well as the exports of their products. Guided by this plan, on September 19, 2006, a notice on *Commodities Catalog of Adjusting Export Tax Rebating Rates and Addition of Processing Trade Ban* (MF and SAT, 2006) was cooperatively enacted by the Ministry of Finance, State Administration of Taxation, and National Development Reform Commission (NDRC). As stated, the rebating rates for most non-metallic mineral products except salt, cement, paraffin, asphalt, lead–acid batteries, and mercuric oxide batteries would be canceled; for steel it would be reduced from 11% to 8%, and for leather, ceramics, cement and glass the rebating rates would be reduced from 13% to 8% and 11%. One distinct difference of this document from the early documents that intended to reduce the export tax rebating rates of energy-intensive products was that the rebating rates of some high-tech products like major technical equipment, IT products and bio-pharmaceutical products were increased from 13% to 17%, which showed that the government encouraged the development of high-tech industries and meantime hoped that the low-efficiency energy-intensive production capacities could move up to high-tech industries. Just 1 year later the Ministry of Finance and State Administration of Taxation further noticed on *Reducing Export Tax Rebating Rates of Some Commodities* (MF and SAT, 2007), and stated that the rebating rates for totally 553 energy-intensive, resource-intensive and pollution-intensive products like cement, glass, leather and non-ferrous metal products would be canceled and the rebating rates for glass, steel, ceramics and so on would be reduced to 5%.

The trend to prohibit the exports of energy-intensive, resource-intensive and pollution-intensive products by reducing the export tax rebating rates policy stopped when the worldwide economic crisis hit China in 2008. In order to stimulate the economic recovery as soon as possible, the Ministry of Finance and State Administration of Taxation enacted several documents to increase the export tax rebating rates of exported commodities (MF and SAT, 2008a; 2008b; 2008c; 2008d; 2009a; 2009b; 2009c) and most of the energy-intensive products were covered in the scope. After the last round of export tax rebating rate adjustment, the export tax rebating rates of most plastic products, glass and ceramics, steel and chemical products were increased to 11%, 13% or even higher level. These encouraging measures greatly promoted the development of energy-intensive industries and stimulated some low-efficiency production capacities revival, while causing huge damage to the energy and environment security.

The fast growth of energy-intensive industries for economic recovery stopped when the document ‘*Canceling the Export Tax Rebating Rates for Some Commodities*’ (MF and SAT, 2010) was published on June 22, 2010, through which the export rebating rates for most energy-intensive products were canceled. This policy was enacted in the background where the energy-intensity of GDP in China was promised to be reduced by 20% by the end of 2010 compared to the level of 2005, while the encouragement for developing energy-intensive industries in 2008–2009 made it very difficult for China to realize this goal since the accumulated energy-intensity of GDP was reduced by

only 14.38% during 2005–2009, which left a heavy task for the work in 2010 and this policy was targeted at overcoming the challenge by restricting the domestic over-development of low-efficiency energy-intensive production capacities. The effect of this policy was obvious and by the end of 2010 the official statistics showed that the accumulated energy-intensity of GDP had been reduced by 19.1% ([28,29]), slightly lower than the promised level.

The Chinese government enforced stricter regulations on the development of energy-intensive industries, and this was verified by the national teleconference on energy conservation and emission reduction work on September 27, 2011, held by the State Council. The main target of the teleconference was to mobilize and deploy the works on energy conservation and emission reduction for the 'twelfth five-year (2011–2015) plan' and five major works would be done as stated during the planned period, including adjusting and optimizing the industrial structure, innovating and improving energy conservation and emission reduction technologies, completing the long-term energy conservation and emission reduction mechanisms, enhancing the energy conservation and emission reduction capabilities and promoting key areas of energy conservation and emission reduction. It was also stated that as a policy aiming at building the long-term energy conservation and emission reduction mechanism, China would further reduce the exports tax rebating rates for most of the energy-intensive, pollution-intensive and resource-intensive commodities and it was expected to come into effect in 2013 [35].

3.2. Resource tax

China's resource tax policy was developed in 1984 when the government began to establish its own resource tax system. As noted in '*China Resource Tax Ordinance (draft)*' [37], the companies engaging in domestic exploration of crude oil, natural gas, coal and iron ore should pay resource tax to the government according to their sale profit rate levels (Table 1). This document lost its effects when the government published the '*China Resource Tax Interim Ordinance*' [38] on December 25, 1993. According to the provisions, the resource tax levying scope of commodities was enlarged and the commodities generated from ferrous metal ore, non-ferrous metal ores, other non-metallic ores and salt were brought into this scope. The tax calculation basis also changed and the output substituted sale profit rate as the calculating basis (Table 1). The effects of this document lasted for about 18 years and were lost when the SC announced "*The State Council Decide to Revise the* '*China Resource Tax Interim Ordinance*'" on September 21, 2011. The enacting of revised ordinance was based on several provinces' trial practices like Xinjiang, Gansu, Ningxia, Qinghai and so on. Most of these provinces are located in the west part of China and are rich in oil, coal and some important metal resources. One of the key characteristics of this document was that the resource tax calculation basis for the crude oil and natural gas had been changed from output base to price base (Table 1). Meanwhile the levying standards for coal, non-metallic ores and non-ferrous metals ores were further divided into two categories with different levying levels, in which the levels of coking coal, precious non-metallic ores were obvious higher than others.

3.3. Administrative audit and approval authority

Administrative audit and approval authority is a policy designed for the executive examines and approves the application from the natural persons, legal persons or other organizations for engaging in certain activities, recognizing their qualification, and verifying the specific civil relationships or civil rights and capacity behaviors. In the past, for most of the projects, starting applications were submitted to the central governmental organizations for an approval. This process took a very long time, sometimes several months or even several years, and wasted lots of applicants' time and human resources. With the rapid development of China's economy in last two decades, the government found that the large scale of administrative audit and approval authorities owned by the central officials constructed lots of obstacles for fertilizing the investments which were the major pull for China's economy. So in the past one decade, the State Council totally launched seven rounds of policy adjustment to reduce the central

Table 1
Evolvement of resource tax.

Sources	Levying scope	Tax calculation basis
China Resource Tax Ordinance (draft)	Crude oil, natural gas, coal and iron ore	Given that the sale profit ratio is no more than 12%, the resource tax rate is 0 Given that the sale profit ratio is more than 12% and on more than 20%, the resource tax rate increases 0.5% when the sale profit ratio increases 1% Given that the sale profit ratio is more than 20% and no more than 25%, the resource tax rate increases 0.6% when the sale profit ratio increases 1% Giveng that the sale profit ratio is more than 25%, the resource tax rate increases 0.7% when the sale profit ratio increases 1%
China Resource Tax Interim Ordinance	Crude oil, natural gas, coal, other non-metallic ores, ferrous metal ores, non-ferrous metal ores, salt	Crude oil: 8–30 Yuan[a]/ton Natural gas: 2–15/1000 m^3 Coal: 0.3–5 Yuan/ton Other non-metallic ores: 0.5–20 Yuan/ton or cubic meters Ferrous metal ores: 2–30 Yuan/ton Non-ferrous metal ores: 0.4–30 Yuan/ton Solid salt: 10–60 Yuan/ton Liquid salt: 2–10 Yuan/ton
The State Council Decide to Revise the '*China Resource Tax Interim Ordinance*'	Crude oil, natural gas, coal, other non-metallic ores, ferrous metal ores, non-ferrous metal ores, salt	Crude oil and natural gas: 5–10% of the sales Coking coal: 8–20 Yuan/ton Other coal: 0.3–5 Yuan/ton Ordinary non-metallic ores: 0.5–20 Yuan/ton or cubic meters Precious non-metallic ores: 0.5–20 Yuan/kg or carat Ferrous metal ores: 2–30 Yuan/ton Rare earth mine: 0.4–60 Yuan/ton Other non-ferrous metal ores: 0.4–30 Yuan/ton Solid salt: 10–60 Yuan/ton Liquid salt: 2–10 Yuan/ton

[a] Yuan is the abbreviation of the Chinese currency unit.

officials' power on administrative audit and approval authority and simplify the application approving procedures to facilitate the investment activities (SC, 2002; 2003; 2004; 2007; 2010b; 2012; 2013).

This adjustment process described above was labeled as the central governmental 'decentralization'; however, as for the energy-intensive industries, the label was different. On December 23, 2003, the State Council issued a document named '*some provisions on prohibiting the blind investments on iron and steel, electrolytic aluminum, cement and other industries*', in which it was stated that the local government no longer has the authority to audit and approve the starting projects like iron and steel, electrolytic aluminum, and cement projects, and all the starting applications of these projects should be submitted to the national investment authorities for feasibility examination and then to the State Council for approval. The central government believed that the overdevelopment of low-efficiency productions forces of energy-intensive industries was because the local government did not strictly examine the influences of energy-intensive projects in the auditing process. So the central government withdrew the local governmental power and intended to prohibit the starting of projects designed for low-efficiency production capacities. However, the auditing process by the central governmental official SC used to last for a very long period and some projects began to construct and operate even if they did not receive approvals. The number of these projects was so large that the government planned to take measures to prevent similar things. A document named as *several advices on inhibiting the overcapacity and redundant construction in some industries so as to guide their healthy developments* (SC, 2009) was published intending to realize this goal, in which the projects that started their construction without approvals from State Council were severely criticized and the central government commanded the local government to stop these projects and promise that these things would never happen again. Meanwhile, the NDRC and NEA (National Energy Administration) also took several measures to revoke the audit authorities from the local governments.

The effects of the policy aiming at reducing the low-efficiency production capacities of energy-intensive industries by central governmental auditing were so limited that it was estimated that by the end of 2012, about 60% of the steel projects and 85% of the electrical aluminum started without the SC's approvals [40]. This demonstrated that the controlling guided by governmental intervention could not effectively work and it was anticipated that the government can cancel the central governmental auditing and resort to some market mechanisms like industrial polices, financial instruments and land policies. As believed, the SC's auditing authorities on the energy-intensive industries would be canceled in the document named *Canceling and lowering the management level of a batch of projects' administrative audit and approval authority* (SC, 2013). The truth was that the energy-intensive industries were not in the list of industries on which the central governmental auditing authorities would be canceled. Although this astonished several scholars and related people, the action reflected that the central government believed that the conditions for decentralizing this authority were not mature since the market mechanisms were not perfectly constructed.

3.4. Differential electric power pricing

Differential electric power pricing (DEPP) is a policy designed to set different electric power pricing levels for the energy-intensive companies according to their electricity consumption levels, which means the companies with higher electricity use will be levied with higher electric power price. According to this policy, the energy-intensive companies were divided into three groups, namely allowed and encouraged companies, restricted companies and eliminated companies according to their efficiencies of electricity use. The electric power price levied for allowed and encouraged companies will not change compared to the normal level of industrial electric power price, while for the restricted and eliminated companies it will be raised, and the increased prices are called restricted electric power price and eliminated electric power price respectively. The DEPP policy was considered as an important tool to encourage the low-efficiency productive forces upgradation to advanced productive forces. A detailed summary of the evolution of the DEPP policy before 2008 can be seen in Li's work [19] and as mentioned the biggest obstacle for implementing the DEPP policy is that the local government is unwilling to implement this policy because they cannot receive any benefits while losing the GDP contribution from the energy-intensive industries. In order to clear this obstacle the central government enacted a policy called *further strengthening of the work to conserve oil and electric power* [39] in 2008, in which it announced that the local governments would no longer turn the revenues earned by implementing the DEPP policy to the central government, and they can make their own use of this money in energy conservation works. This greatly improved the local governmental initiatives in implementing the DEPP policy and in the following 2 years several provinces, most of which are economic developed regions, released their executing programs. The effects of the DEPP policy in guiding the upgrading of the energy-intensive industries became increasingly obvious in these provinces.

However, contrary to the practices of the developed provinces, some undeveloped provinces like Hebei, Inner Mongolia, Gansu, and Ningxia implemented relatively favorable electric power prices for the energy-intensive companies no matter what their electricity consumption levels were [4], which had attracted large quantities of low-efficiency production capacities eliminated by the developed provinces. The government enacted the document on *further intensifying the efforts to ensure realizing the energy conservation and emission reduction targets of the 'eleventh five years'* (SC, 2010a) noting that the local government can adjust the increasing levels according to its own conditions, which granted the local government a higher authority to implement the DEPP policy. Meanwhile, the punitive electric power price (PEPP) policy was also enacted for the energy-intensive companies whose energy-intensities of production were obviously higher than the given standards. The PEPP policy will be implemented by the local government. Just 7 days later the NDRC released the document on *cleaning the favorable electric power price for energy-intensive companies* (NDRC, 2010), which called for the local government to cancel the favorable electric power prices for the energy-intensive companies and the DEPPs for the restricted and eliminated energy-intensive companies would increase 0.1 Yuan/kWh and 0.3 Yuan/kWh respectively. Guided by this document, many local governments revised their DEPP implementing programs (see Table 2). In recent days some ministries are working together to carry out diverse DEPP implementing standards for different energy-intensive industries [42].

3.5. Shutting down the low-efficiency production capacities

On July 25, 2013, the Chinese Ministry of Industry and Information Technology (MIIT) released a list of enterprises to force them to shut down their low-efficiency production capacities [22], mainly covering the energy-intensive industries like steel, nonferrous metal, coke, cement, paper and calcium carbide. According to this list, total low-efficiency production capacities of 12.16 million tons of steel, 1.96 million tons of aluminum, 14.05 million tons of coke, 3.45 million tons of cement, 74.55 million tons of paper and 1.133 million tons of calcium carbide will be forced to

Table 2
Current DEPP and PEPP programs of some provinces.

Provinces	Programs	Program content	Electric power price increased
Shanghai	DEPP	Restricted electric power price	0.15 Yuan/kWh
		Eliminated electric power price	0.40 Yuan/kWh
	PEPP	For the companies whose energy intensity is more than the standard by one times less	0.15 Yuan/kWh
		For the companies of which the energy intensity are more than the standard by one times more	0.40 Yuan/kWh
Jiangsu, Zhenjiang, Inner Mongolia	DEPP	Restricted electric power price	0.10 Yuan/kWh
		Eliminated electric power price	0.30 Yuan/kWh
	PEPP	For the companies whose energy intensities are more than the standard by one times less	0.10 Yuan/kWh
		For the companies whose energy intensities are more than the standard by one times more	0.3 Yuan/kWh
Fujian	DEPP	Restricted electric power price	0.10 Yuan/kWh
		Eliminated electric power price	0.3 Yuan/kWh
	PEPP	For the companies whose energy intensities are more than the standard	0.10 Yuan/kWh
Chongqing	DEPP	Restricted electric power price	0.10 Yuan/kWh
		Eliminated electric power price	0.20 Yuan/kWh
Hebei	DEPP	Restricted electric power price	0.1 Yuan/kWh
		Eliminated electric power price	0.4 Yuan/kWh
	PEPP	For the companies whose energy intensities are more than the standard by one times less	0.10 Yuan/kWh
		For the companies whose energy intensities are more than the standard by one times more	0.3 Yuan/kWh
Shandong	DEPP	Restricted electric power price	0.10 Yuan/kWh
		Eliminated electric power price	0.30 Yuan/kWh
	PEPP	For the companies whose energy intensities are more than the standard by more than 10%	0.02 Yuan/kWh
		For the companies whose energy intensities are more than the standard by 10% to 30%	0.05 Yuan/kWh
		For the companies whose energy intensities are more than the standard by 30% to 50%	0.10 Yuan/kWh
		For the companies whose energy intensities are more than the standard by 50% to 100%	0.20 Yuan/kWh
		For the companies whose energy intensities are more than the standard by one times more	0.30 Yuan/kWh
Guangdong	DEPP	Restricted electric power price for cement enterprises	0.30 Yuan/kWh
		Restricted electric power price for non-cement energy-intensive enterprises	0.10 Yuan/kWh
		Eliminated electric power price for non-cement energy-intensive enterprises	0.30 Yuan/kWh
	PEPP	For the companies of which the energy intensities are more than the standard by on more than 30%	0.05 Yuan/kWh
		For the companies of which the energy intensities are more than the standard by 30% to 70%	0.10 Yuan/kWh
		For the companies of which the energy intensities are more than the standard by 70% to one times	0.15 Yuan/kWh
		For the companies of which the energy intensities are more than the standard by one times more	0.30 Yuan/kWh

[32,6,18,3,41]; Guangzhou [15]; [43,33,34]; NetEase, 2010.

withdraw from the market at the end of September 30. 2013. All of these low-efficiency production capacities should not be transferred to other regions.

The publishing of this list was intended to complete the goals of shutting down low-efficiency production capacities in 2013 set by MIIT in its document on *goals and tasks of eliminating the low-efficiency capacities of 19 industries in 2013* [16], which can be considered as the subsequent measure of the SC's document on *further strengthening the elimination of low-efficiency production capacities* (SC, 2010c), and in this document the shutting down goals of low-efficiency production capacities to be achieved before 2012 is set, with emphasis on the importance of this work and clearing the specific tasks that each department of the government should do.

4. Assessment of the policies' effects

4.1. Methodology

The energy-intensity of industrial added value was firstly chosen to reflect the energy efficiency status of energy-intensive industries, which can be calculated by

$$EEF_j = \frac{E_j}{V_j} \tag{1}$$

where EEF_j, E_j, and V_j are the energy intensity, energy consumption and added value of energy-intensive industry j respectively.

The trends of the energy-efficiency was examined by the VALDEX index method which is calculated by

$$D_{eef} = \frac{1}{\sum_j (E_j^T/E^T)(V_j^0/V_j^T)} \tag{2}$$

where E_j^T represents the energy consumption of industry j in time T, and E^T represents the aggregate energy consumption of energy-intensive industries; V_j^0 and V_j^T represent the added value of industry j in time 0 and T.

In order to make more in-depth analysis for the effects of the polices listed in Table 3, some indicators like the fixed asset investment growth rate and waste gas emissions-intensity of industrial added value were also selected to examine the effects of these policies on the overall development of the energy-intensive industries.

4.2. Data

The data on industrial added value before 2009 was collected from the national statistical yearbooks which can be browsed on the official website of National Bureau of Statistics of China [26]; however, since the yearbooks after 2009 do not contain the data on each sector's industrial added value, the data on industrial added value of energy-intensive industries in 2009–2010 was estimated by multiplying the industrial added value of 2008 and its cumulative growth rate collected from the monthly data published on the website of National Bureau of Statistics of China. The data on energy consumption for each sector was collected from the energy statistical energy yearbook 2007 and 2013 [12]. The data on waste gas emissions was collected from official website of the NBSC [13].

4.3. Results

4.3.1. Energy-intensity of industrial added value

Fig. 6 presents energy-intensity of industrial added value for the energy-intensive industries from 2003 to 2012. It can be seen

that the energy-intensity of industrial added values for the energy-intensive industries decreased sharply in the period of 2003–2012, which reduced from 5.985 t/10,000 Yuan in 2003 to 3.126 t/10,000 Yuan in 2012, by 47.77%. The industrial aggregate energy-intensity of added value decreased from 2.294 t/10,000 Yuan in 2003 to 1.264 t/10,000 Yuan in 2012, by 44.87%. The gap between the aggregate level of energy-intensive industries and the industrial aggregate level became increasingly small, which was 3.619 t/10,000 Yuan in 2003, while in 2012 the gap narrowed into 1.962 t/10,000 Yuan.

4.3.2. Trends of energy-intensive intensity

Fig. 7 presents the year to year improving trends of energy intensity of industrial value added for the five energy-intensive industries from 2003 to 2012. As shown the improvement of energy intensity is the most obvious in 2005–2006, especially for the SPNM and MNMP industry. The years 2005 and 2006 had undergone a period of intensive implementation of policies on reducing the export tax rebating rates of some commodities, especially for the energy-intensive, pollution-intensive and resource-intensive products. The energy-efficiency for most of the energy-intensive industries decreased substantially in 2004, which was mainly caused by the negative improvement of PPCPNF and MNMP industry. Fig. 8 shows that the fixed asset investment growth rate of most of the energy-intensive industries also reached high points in 2004, although the policies on reducing export tax rebating rates had been implemented in the start month of 2004. This implies that the export tax rebating rates policies had some little delayed impact on the real development of energy-efficiency for energy-intensive industry. However, the overall effects of reducing export tax rebating rates policies in improving the energy-efficiency of energy-intensive industries are very effective also in restricting the rapid growth of investment.

In the following years after 2006, especially in 2008–2010, there existed a period of intensive implementation of reducing export tax rebating rates policies to encourage the development of energy-intensive industries for the world economic downturn. These encouraging policies did not result in apparent declining in energy-efficiency for most of the energy-intensive industries in 2008–2010; on the contrary, the aggregate level of the energy-intensity improved moderately in that period. The reasons might be that on one hand, most of the low-efficiency capacities had been removed before 2006 because of the intensive implementation of policies on reducing export tax rebating rates, and on the other hand China had implemented the DEPP policy to restrict

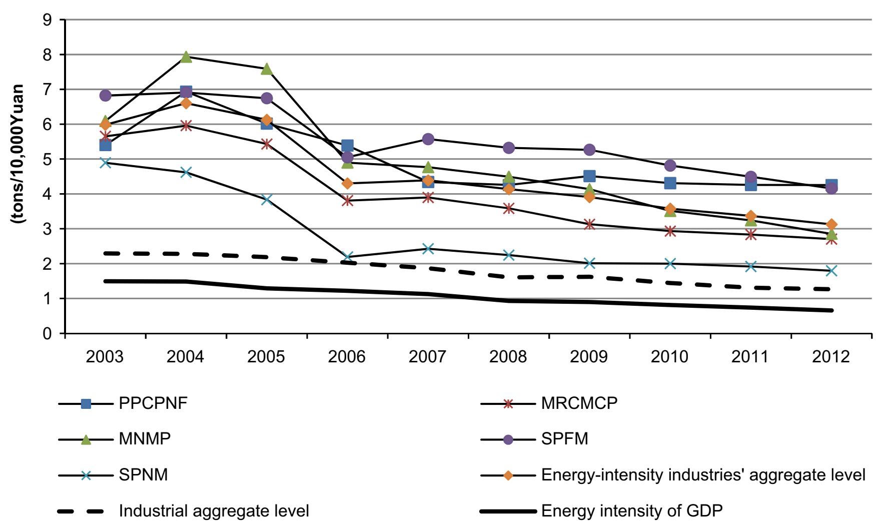

Fig. 6. Energy intensity of industrial added value for the energy-intensive industries in 2003–2012.

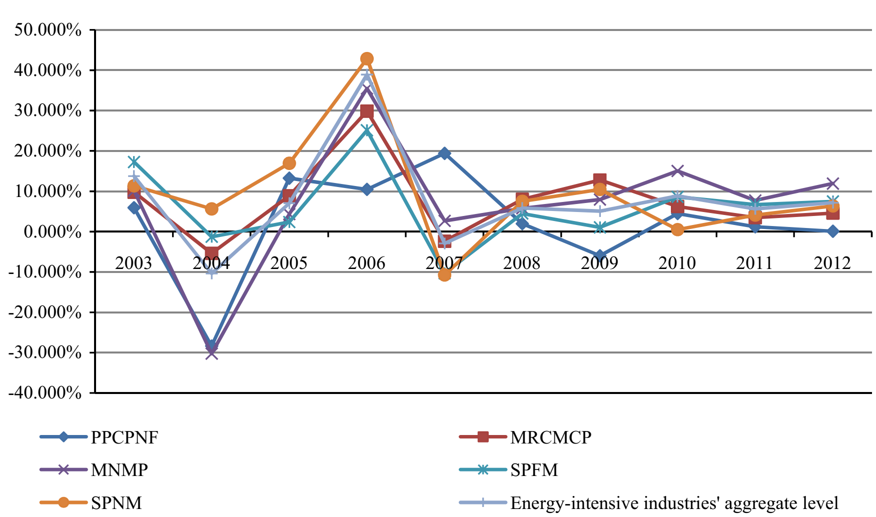

Fig. 7. Improving trend of energy intensity of industrial added value for energy-intensive industries in 2003–2012.

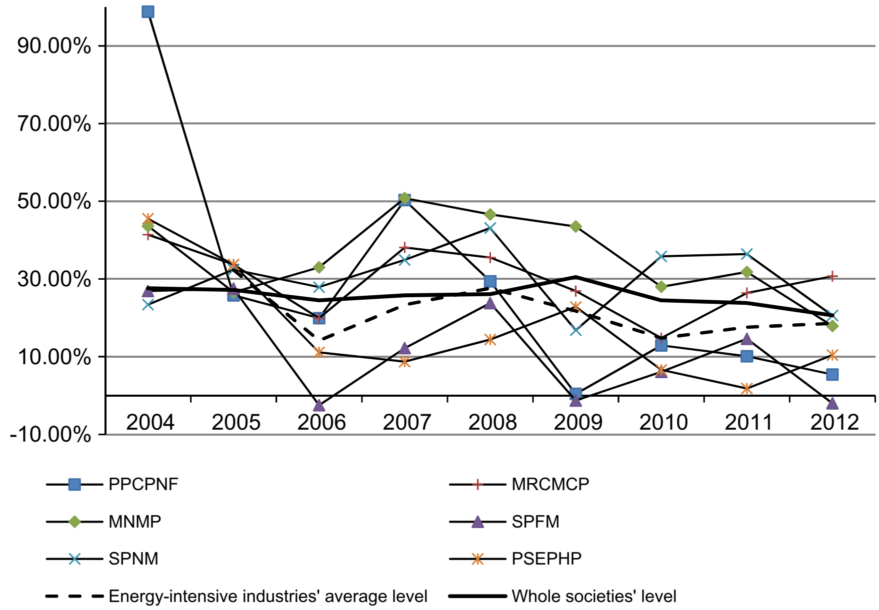

Fig. 8. The fixed asset investment growth rate of the energy-intensive industries in 2004–2012.
Data sources: self-collected from the website of National Bureau of Statistics of China [26].

the operation of low-efficiency capacities and encourage the investment in high-efficiency capacities to save resources and energy.

The energy-efficiency for most of the energy-intensive industries slightly improved in 2011 and 2012, when '*China Resource Tax Interim Ordinance*' was implemented. This implies that in guiding the energy-efficiency improvement of energy-intensive industry, both the economic policies and fiscal policies are effective; however the actual response shows that the effects of economic policies seem more apparent than the effects of fiscal policies.

The curves in Fig. 7 also show that the effects of the policies on improving the energy-efficiency of different energy-intensive industries also varied largely. Generally speaking, in 2004–2006, the energy-efficiency improvements of PPCPNF and MNMP industry changed most dramatically; the energy-efficiency improvements of SPNM industry was the highest among all the energy-intensive industries. In 2007–2009 the energy-efficiency improvement of MRVMP industry was the most obvious compared to other industries, while in 2010–2011 the energy-efficiency improvement of MNMP industry was the most obvious.

4.3.3. *Fixed asset investment growth rate*

The fixed asset investment growth rate of the whole energy-intensive industries decreased from 32.28% in 2005 to 18.57% in 2012, and among them the downward trend of the PPCPNF industry was the most obvious, whose growth rate was 98.80% in 2005 but 5.40% in 2012. The sharp decline in 2005 mainly contributed to the effects of the policy *Adjusting Export Tax Rebating Rate of Some Commodities* (MF and SAT, 2003), in which the export tax rebating rate of petro-products had been canceled which showed the government's determination to protect the petro-resources.

The fixed asset investment growth rate of the energy-intensive industries underwent two obvious declines in 2006 and 2009 (Fig. 8); the first decline in 2006 was a result of the policies like reducing the export rebate rates and DEPP policy, and the second decline in 2009 was most likely contributed by the economic crisis. The fixed assets investment of many energy-intensive industries boomed in 2006–2008 and 2010–2011. The first boom in 2006–2008 was mainly contributed by the economic pull effects of 2008 Beijing Olympic Games and one thing that must be mentioned is that since 2006 China's real estate industry began to soar, which also made great contributions to the investing boom of some energy-intensive industries like MNMP, SPNM and SPFM industries. The second boom in 2010–2011 can be attributed to the favorable laws enacted in 2008 intended to promote the export tax rebating policies. It can be clearly seen that since 2012 there was a new round download development of the fixed asset investment growth rates for several energy-intensive industries, especially the SPFM industry, whose investment growth rate was reduced to -2.00% in 2012, this was resulted by the strict regulation policies enacted since 2010.

The overall trend of the fixed asset investment growth rates during last few years shows that most of the regulating policies are effective in restricting the new investment of energy-intensive industries in short term. However, the long-term effects were uncertain because most of these policies aimed at increasing the costs of energy-intensive enterprises, this could not effectively cut down the investment passion of energy-intensive industries when the market need was strong, this because the investors decide to invest on a project when they believe the project is profitable, and not just when it is cost-saving. If the market can provide them more returns which can make up the costs increase, they will invest.

4.3.4. *Waste gas emissions-intensity of industrial added value*

Fig. 9 presents the change of the waste gas emission-intensity of industrial added value for energy-intensity industries from 2003 to 2012. It is shown in the figure that despite the changes of waste gas emission-intensity of industrial added value that fluctuated during the research period, there was little improvement compared to the level of 2003, this is the case not only for the energy-intensive industries, but also the same for the whole industries. The waste gas emission-intensity of industrial added value for the energy-intensive industry was 8.18 m^3/10,000 Yuan and in 2012 the number was 7.21 m^3/10,000 Yuan, slightly lower than the level in 2003. The industrial average waste gas emission-intensity of industrial added value showed more favorable changes, which was 3.75 m^3/10,000 Yuan in 2003 and 3.18 m^3/

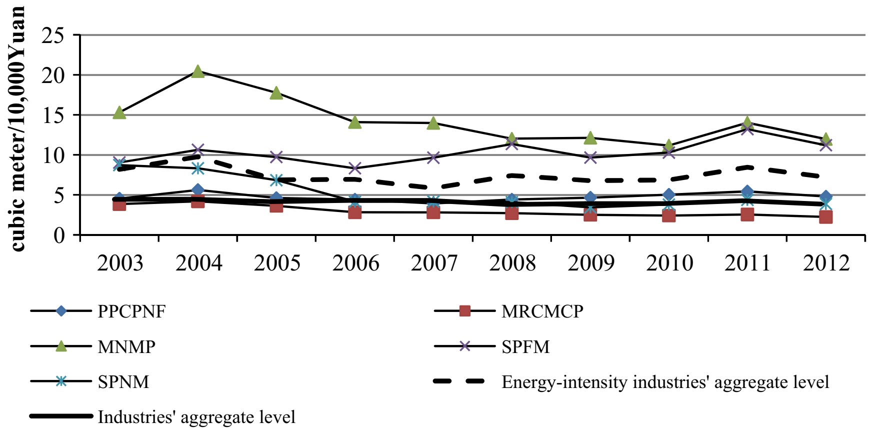

Fig. 9. Waste gas emissions-intensity of industrial added value for the energy-intensive industries in 2003–2012.

10,000 Yuan in 2012, and decreased by 15%% over the research periods.

4.4. Discussion

Comparing the results of improving trends in energy-intensity and fixed asset investment growth rate of energy-intensive industries (Figs. 7 and 8), it can be seen that, normally the years with high growth rate of fixed asset investment always experienced times with lower improvement in energy-intensity; this finding is especially obvious in 2004–2007. The phenomenon seems to say that the policies designed to encourage the development of energy-intensive industries will also bring negative effects on the improvement in their energy efficiency. However the findings in the following years like 2008–2010, which also experienced a period of encouraging development of energy-intensive industries, show that the improvement in energy-efficiency of energy-intensive industries did not obviously fall. The reasons were discussed in Section 4.3.2 as removing low-efficiency capacities before 2006 and reinforcing on DEPP policies in that period. The above analysis shows that compared to the capacities with higher-efficiency, the low-efficiency capacities tend to be more sensitive to the policies; in the times with encouraging policies they boom, while in the times with discouraging policies they rapidly fall in depression. Besides, although it seems that the contrast between the development and improvement in energy-efficiency of energy-intensive industries cannot be eliminated, this contrast can be weakened by encouraging the investment in high efficiency capacities.

The improvement in the waste gas emissions-intensity is rather lower than the improvement in the energy-intensity of energy-intensive industries. This implied that the policies that the government enacted to improve the energy efficiency of energy-intensive industries exerted little effects on improving the waste gas emissions efficiency.

5. Comments

5.1. Challenges

The policies that China applied on the energy-intensive industries to reduce the low-efficiency production capacities covered various aspects and indeed played an active role in guiding the energy-intensive enterprises to develop on a more energy-efficient way. However, there are still so many challenges that should be overcome, including some of these.

5.1.1. Direct governmental intervention dominates the existing policy system

Government always played an important role in guiding the industrial development and transition in China, and this was true also for the energy-intensive industries. Sometimes these interventions created really profound positive effects; however, as for the energy-intensive industries, the practice was not obvious. This can be proved by the inefficient practice of the central governmental administrative audit and approval authority policy, which is intended to reduce the low-efficiency production capacities for the energy-intensive industries by central governmental strict supervision on entry; the fact is that there existed a large number of projects started without any approvals. We always say that if the hands grasp things too far, the arms will become too fragile to carry any weight. This is also the case for the central government. It is the time for the central government to reduce the direct interventions in the development of energy-intensive industries and construct more effective market mechanisms to guide the transitions.

5.1.2. Cost controlling feature policies

It is very obvious that costs controlling can be used to feature the past Chinese governmental policies on guiding the low-efficiency production capacities of energy-intensive industries to withdraw from the market. Cost is surely one of the most important factors that influence the profit of an enterprise, but the cost surplus can be easily compensated by other factors like the gains. Just as it mentioned in analyzing the exports growth of the energy-intensive products, strong market demand situation played a more important role in booming the industry than the policies since the costs generated by these policies were too small compared to the market gains.

5.1.3. Lack of sufficient effective encouraging measures

Another characteristic of the current policy system in regulating the energy-intensive industries is punishment-oriented; this is particularly evident for the DEPP and PEPP policy, which intend to punish the enterprises if the electricity consumption is higher than the standard level. However there was not enough encouragement for the enterprises with lower electricity consumption. Since transition to energy-efficient operation needs investment, and it is not economically feasible for the punished companies to move to top level, most of them will remain near the standard level because at that level they will not be punished any more. Lack of sufficient encouragement is the main drawback of the current DEPP and PEPP policy.

5.1.4. Missing environmental regulation

The analysis on the change of waste gas emission-intensity of industrial added value shows a very disappointing point that the environmental pollution of the energy-industries had not been made much better in last few years; this is also the truth for other industries, which demonstrates that the current policy system really misses the kind of policies to guide the energy-intensive enterprises to develop in a lower waste gas emission way.

5.2. Suggestions on future policies

5.2.1. Establish efficient market competing mechanisms

The competing mechanism based on market economy used to be considered as the most efficient way for eliminating the low-efficiency production capacities, and governmental intervention on the market competence will throw it into confusion. What the governments really need to do is to establish the basic laws and rules to help the market competing mechanism work efficiently, such as providing financial support to help the workers from the eliminated low-efficiency forces to find new jobs, strengthen the special checks on energy-intensive companies' implementation on environmental and safe laws and standards, and so on.

5.2.2. Reform the performance evaluation mechanism for local officials

The Chinese GDP based performance evaluation mechanism for local officials should be immediately reformed as it has caused serious negative effects on the local environment, human health and investment. The government should also put forward a new efficient performance evaluation mechanism for local officials, in which people's happiness, environmental improvement, employment, education and health safety condition are included and weighted high.

5.2.3. Improve DEPP policy

The DEPP policy for the energy-intensive industries should be updated in the following two directions. The first one is that there should be an encouraging price for the companies with lower electricity-consumption level, which can further stimulate the low-efficiency forces to raise their energy efficiency. The second one is that the DEPP policy should be designed separately for each energy-intensive sector to reflect their difference in energy use, production process and so on.

5.2.4. Put forward effective waste gas emission regulation policies

The lack of environmental regulation and supervision has caused serious air pollution by the energy-intensive industries and the government should put forward more measures to guide them reduce the air pollutant emissions. The first thing that can be done is to enlarge the implementation scope of emission rights trading mechanism which was put into practice in several provinces for trial. Another thing that should be done is to establish a carbon taxation system to guide the enterprises with heavy pollution move into cleaner production.

5.2.5. Encourage energy-intensive enterprises to invest overseas

Investing overseas is an efficient way to eliminate extreme domestic energy-intensive industrial capacities. China can make this come true through enacting policies encouraging joint construction of overseas industrial parks, providing financial supports for overseas development and so on. Transferring these domestic overcapacities can lead to the optimization and upgrading of energy-intensive industries.

6. Conclusions

As one of the largest energy consumers and pollutant emitters in the world, China has faced serious energy conservation and emission reduction pressure for its sustainable development, and even world's energy security and environmental protection. The energy-intensive industries, which made great contribution to China's economy, had also consumed plenty of energy and caused large pollution. Forced by the pressure of energy conservation and emission reduction, China had enacted several policies designed to eliminate the low-efficiency production capacities for conserving energy of energy-intensive industries. These policies have been reviewed in this paper, and the effects of these efforts have been examined by analyzing some important indicators, including the energy-intensity of industrial added value used to reflect the status of energy efficiency, VALDEX used to reflect the improving trend of energy efficiency, fixed asset investment growth rate used to reflect the development trends, exports growth, waste gas emission-intensity and industrial added value used to reflect the gas emission efficiency.

The results of the analysis on energy-intensity and VALDEX show that the energy efficiency of energy-intensive industries has greatly improved during the research period, and the export tax rebating rate policy played an important role in affecting the improvement of energy-efficiency. The years with heavy reduction in export tax rebating rate always experienced obvious improvement in energy efficiency, coupled with obvious reduction in investment growth, which implies that the low-efficiency capacities are more sensitive to the policies than the high-efficiency capacities. Compared with the fiscal policies like resource tax, the economic policies like export tax rebating rate and DEPP seem more effective and faster in improving the energy-efficiency of energy-intensive industries. The results of energy-intensity and waste gas emissions intensity of energy-intensive industries also implied that the policies intended to improve energy efficiency may not necessarily exert effects on improving waste gas emissions efficiency.

Our analysis also shows that although the energy efficiency of energy-intensive industries has greatly improved during the last few years the energy-intensive industrial aggregate level is still very higher than the industrial aggregate level, which implies there is still room for the energy-intensive industries to improve energy-efficiency. In order to guide this improvement the current policies system should overcome the current challenges, including (1) government intervention dominated characteristics; (2) cost controlling features; (3) lack of sufficient effective encouraging measures; and (4) missing environmental regulations. Our suggestions for the future policies making are (1) establishing efficient market competing mechanisms; (2) reforming the performance evaluation mechanism for local officials; (3) improving the DEPP policy; (4) putting forward effective waste gas emission regulation policies; and (5) encouraging the energy-intensive enterprises to invest overseas.

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Appendix A

List of the major regulation policies for the energy-intensive industries in China.

Type of policy	Name of policy	Effective date	Responsible agency
Export tax rebating policy	Levying and rebating the product tax and value-added tax for the imported and exported products ([21] [document 97].)	April 1, 1985	MF and SAT
	Adjusting export tax rebating rates of some commodities (MF and SAT, 2003 [document 222].)	January 1, 2004	MF and SAT
	Better designing support measures for controlling the export of high energy consumption, high pollution and resource products ([27] [document 1482 [20]].)	July 28, 2005	NDRC, MF and MC
	Catalog of commodities used for adjusting export tax rebating rates and addition of the processing trade ban (MF and SAT, 2006 [document 139].)	September 15, 2006	MF and SAT
	Reducing export tax rebating rates of some commodities (MF and SAT, 2007 [document 90].)	July 1, 2007	MF and SAT
	Adjusting the export tax rebating rates for some commodities like textiles and clothing (MF and SAT, 2008 [document 111].)	July 30, 2008	MF and SAT
	Raising the export tax rebating rates for some commodities (MF and SAT, 2008 [document 138].)	November 1, 2008	MF and SAT
	Raising the export tax rebating rates of vat for some commodities like labor-intensive products (MF and SAT, 2008 [document 144].)	December 1, 2008	MF and SAT
	Raising the export tax rebating rates of some commodities like mechanical and electrical products (MF and SAT, 2008 [document 177].)	January 1, 2009	MF and SAT
	Raising the export tax rebating rates for textile and apparel products (MF and SAT, 2009 [document 14].)	February 1, 2009	MF and SAT
	Raising the export tax rebating rates for some commodities like textile, electronics and information products (MF and SAT, 2009 [document 43].)	April 1, 2009	MF and SAT
	Further raising the export tax rebating rates for some commodities (MF and SAT, 2009 [document 88].)	June 1, 2009	MF and SAT
	Canceling the export tax rebating rates for some commodities (MF and SAT, 2010 [document 57].)	July 15, 2010	MF and SAT
Resource Tax Policy	China Resource Tax Ordinance (draft; SC, 1984.)	October 1, 1984	SC
	China Resource Tax Interim Ordinance ([38] [document 139].)	January 1, 1994	SC
	The State Council Decide to Revise the 'China Resource Tax Interim Ordinance' (SC, 2011 [document 605].)	November 1, 2011	SC
Administrative audit and approval authority	Canceling the first batch of projects' administrative audit and approval authority (SC,	October 1, 2002	SC

	2002 [document 24].)		
	Canceling the second batch of projects' administrative audit and approval authority and changing the management ways of several projects' administrative audit and approval authority (SC, 2003 [document 5].)	February 27, 2003	SC
	Canceling and adjusting the third batch of projects' administrative audit and approval authority (SC, 2004 [document 16].)	May 19, 2004	SC
	Canceling and adjusting the fourth batch of projects' administrative audit and approval authority (SC, 2007 [document 33].)	October 9, 2007	SC
	Canceling and lowering the management level of the fifth batch of projects' administrative audit and approval authority (SC, 2010b [document 21].)	July 9, 2010	SC
	Canceling and adjusting the sixth batch of projects' administrative audit and approval authority (SC, 2012 [document 52].)	October 10, 2012	SC
	Canceling and lowering the management level of a batch of projects' administrative audit and approval authority (SC, 2013 [document 19].)	May 15, 2013	SC
	Several advices on inhibiting the overcapacity and redundant construction in some industries so as to guide their healthy developments (SC, 2009 [document 38].)	September 26, 2009	SC
Differential electric power pricing	Further intensify the efforts to ensure realizing the energy conservation and emission reduction targets of the ‘eleventh five years’ (SC, 2010a [document 12].)	May 4, 2010	SC
	Clean the favorable electric power price for energy-intensive companies (NDRC, 2010 [document 978].)	May 12, 2010	NDRC
Shutting down the low-efficiency production capacities	Further strengthening the elimination of low-efficiency production capacities (SC, 2010c [document 7].)	April 6, 2010	SC
	Goals and tasks of eliminating the low-efficiency capacities of 19 industries in 2013 ([16] [document 102].)	April 27, 2013	MIIT
	The first list of enterprises for eliminating their low-efficiency production capacities ([22] [document 35].)	August 5, 2013	MIIT

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